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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/718,126      | 11/19/2003  | Mehrdad Nikoonahad   | TNCR.197US1         | 9108             |

36257 7590 04/18/2007  
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| EXAMINER |
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PHAM, HOA Q

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| ART UNIT | PAPER NUMBER |
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2886

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE  | DELIVERY MODE |
|--|------------|---------------|
| 3 MONTHS                               | 04/18/2007 | PAPER         |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

|                              |                        |                     |  |
|------------------------------|------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                              | 10/718,126             | NIKOONAHAD ET AL.   |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                              | Hoa Q. Pham            | 2886                |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### **Status**

1) Responsive to communication(s) filed on 03 January 2007.  
 2a) This action is **FINAL**.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### **Disposition of Claims**

4) Claim(s) 1-127 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-127 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### **Application Papers**

9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on 03 January 2007 is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### **Priority under 35 U.S.C. § 119**

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### **Attachment(s)**

|  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date: _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date: _____   | 6) <input type="checkbox"/> Other: _____                          |

**DETAILED ACTION**

***Drawings***

1. The drawings filed on 1/3/07 have been accepted.

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-27, 39-78, 90-110, 120-127 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kwon (6,519,045) in view of Johs et al (6,859,278).

Regarding claims 1, 40-50, 53, 90-100, 121-122, and 125-126, Kwon discloses a method and apparatus for determining the actual thickness of thin dielectric film on a wafer (10) comprises a light source for illuminating a beam of light along an illumination path, a detector (12) for detecting reflected light from the surface of the wafer for determining the characteristics of the wafer, whereby the apparatus includes a source of inert gas (i.e., nitrogen) tubing to bring the gas to the wafer (column 3, lines 44-62 and column 4, lines 12-22 and figure 4). Kwon also teaches that the spectral reflectometers may cover the visible, ultraviolet, and infrared wavelength ranges could be used (column 4, lines 58-65) and does not explicitly teach the use of vacuum ultraviolet (VUV); however, Kwon suggests that "an optional inert atmosphere system (7) in the form of purging the wafer with inert gas or in the form of a vacuum chamber" (column 4,

lines 12-14); in addition, such a feature is known in the art as taught by Johs et al. Johs et al, from the same field of endeavor, discloses a reflectometer system in which different kinds of wavelength ranges are used (i.e., VUV, UV, Visible, Infrared, etc..) (column 4, lines 47-55). It would have been obvious to one having ordinary skill in the art at the time the invention was made to replace the light source of Kwon by a VUV light source taught by Johs et al if the system is under vacuum condition as mentioned by Kwon. Thus, A substitution one for another is generally recognized as being within the level of ordinary skill in the art.

Regarding claims 2-3, 54-55, see abstract of Kwon for a thickness metrology apparatus.

Regarding claims 4 and 56, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the basic device of Kwon for detecting different characteristics of the wafer such as critical dimension, wall angle, pitch, etc.., if additional measurements are desired.

Regarding claims 5-8, 57-60, see polarizer, compensator and analyzer in figure 4 of Kwon.

Regarding claim 9, it is inherent that the signal from polarizer is perpendicular to the signal from the analyzer.

Regarding claims 10-21, 61-72, see column 4, line 62 of Kwon for the use of an ellipsometer.

Regarding claims 22-23, 26, 73-74, 76-78, see column 4, lines 64-65 of Kwon for the use of visible, ultraviolet or infrared wavelength ranges.

Regarding claims 24 and 75, see figure 4 of Kwon for the focusing beam on the surface of the wafer.

Regarding claims 39, 90 and 110, see figure 4 of Kwon for the oblique illumination.

Regarding claims 51-52, 120, it would have been obvious to leave the wafer of Kwon outside the vacuum chamber so that the wafer is transferred easily without breaking the vacuum, thus increase the accuracy of the measurement.

Regarding claims 101-109, it would have been matter of design choice to choose the dimensions, shape, size of the hole so that it suitable to the designed device.

Regarding claims 123-124 and 127, it would have been obvious to one having ordinary skill in the art at the time the invention was made to include in Kwon an shielding means between the sample and the envelope. The rationale for this modification would have arisen from the fact that by adding such shielding means would prevent the ambient light or unwanted light that may enter the detection system, thus increase the signal to noise ratio.

4. Claims 28-38, 79-89, 111-119 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kwon and Johs et al as applied to claims 1-27, 39-78, 90-110,120-127 above, and further in view of Clementi et al (5,712,701).

Clementi et al teaches a known bright-field illumination system and dark-field illumination (see figures 1, 3 and 6). Thus, it would have been obvious to one having ordinary skill in the art to arrange the optical inspection system of Kwon in bright-field or

dark-field mode as taught by Clementi for the purpose of detecting defects on the surface of the wafer.

### ***Response to Arguments***

5. Applicant's arguments filed 1/3/07 have been fully considered but they are not persuasive.

a. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the present claimed invention was obvious over the combination of references Kwon and Johs et al. First, Kwon discloses a thickness metrology apparatus in which the surface of the sample (10) is illuminated by a light source, the wavelengths of the light source could be in the visible, ultraviolet, and infrared ranges (column 4, lines 58-65 and figure 4), the reflected beam from the sample is detector by detector (12); Kwon also teaches that the thickness of the wafer can be measured under vacuum condition (column 4, lines 12-22). Johs et al teaches different kinds of wavelength ranges can be used in a reflectometer system (column 4, lines 47-55). Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use VUV in the

system of Kwon when the thickness of the wafer is detected under vacuum environment. Second, using VUV is not a critical feature of the present invention, for example, as seen from claims 22 and 73 of the present invention, any ranges of wavelengths can be used.

b. Applicant's remarks argues that the combination of the references does not suggest the limitation "reducing amount of ambient absorbing gases and moisture present in at least a portion of each of the illumination and detection paths by displacing said gases and moisture with another gas that does not substantially absorb the at least one wavelength component so as to reduce attenuation of the at least one VUV wavelength component". Applicant is noted that this limitation is the result of the use of inert gas that introduces into the vacuum chamber (see claims 40-42 of the present invention). As mentioned above, Kwon teaches the use of inert gas or other form of the vacuum chamber (column 4, lines 12-14); thus, the present claimed limitation is taught by Kwon.

In view of the foregoing, it is believed that the rejection of claims 1-127 under 35 U.S.C 103 is proper.

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Woollam et al (6,982,792) discloses a spectrophotometer, ellipsometer, polarimeter and the like systems.

Art Unit: 2886

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hoa Q. Pham whose telephone number is (571) 272-2426. The examiner can normally be reached on Monday through Friday, 8:00AM TO 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tarifur Chowdhury can be reached on (571) 272-2287. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Hoa Q. Pham  
Primary Examiner  
Art Unit 2886

HP  
April 15, 2007